METHOD AND APPARATUS FOR OFFLINE STANDBUILDING

CROSS REFERENCE TO RELATED APPLICATION

The present application is a continuation-in-part of U.S. Application No. 10/734,923, filed December 12, 2003, the disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to an integrated method and apparatus for loading, interconnecting and disconnecting, and storing tubulars on an oil drilling platform without interrupting the drilling process.

BACKGROUND OF THE INVENTION

During a drilling operation on a conventional oil drilling platform, when the drill bit has penetrated such a distance into a borehole that only a small part of the drill string extends upwards from the upper surface of the drill floor, the drilling operation must be stopped, and a new tubular drill string section moved from a storage site or rack positioned outside the drill floor and connected to the upper end of the drill string. Once the new section is connected the drilling operation may be continued. Normally, the length of the drill string sections is 30 feet or about 10 m. This means that each time the drill bit has penetrated further 10 m into the underground the drilling operation has to be stopped and a further drill string section has to be added as described above.

This process creates significant idle time in which no actual drilling takes place. In view of the fact that the investment made in a drilling rig is very high (as an example the daily rent of an offshore rig may be on the order of U.S.$ 50,000) even a relatively small reduction of the necessary idle time is of great economical importance.

One solution commonly used to reduce the idle time on drilling rigs is to assemble two drill string sections, or singles, each having a length of about 10 m into a 20 m stand, or double, placing the singles in a mousehole adjacent to the drilling opening and connecting the singles by using air tuggers and spinning wrenches while the drilling operation proceeds. One exemplary system and apparatus for such offline standbuilding

is described in U.S. Patent No. 4,850,439, the disclosure of which is incorporated herein by reference. However, although these conventional offline standbuilding systems do create significant efficiencies in the drilling process, they generally utilize many complex pieces of equipment, such as, hoists and multi-purpose pipehandling machines that result in a system which is complicated, costly, and requires significant ongoing maintenance.

Accordingly, a need exists for a simpler, less costly system for providing offline stand building and pipehandling functionality to standard oil platforms.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus for moving pipe on a rig floor between a number of different stations including an off-floor rack, a preparation opening, a borehole, and a storage area, such that tubulars can be loaded onto the drill floor, prepared at the preparation opening, loaded onto or off of the storage rack, and connected to the drill string while drilling is simultaneously conducted at the borehole.

In one embodiment, the method and apparatus comprises at least two pipehandling devices for communicating pipe between a storage area off the drill floor, a storage area on the drill floor, at least one preparation opening, and a drill opening.

In one embodiment of the invention one of the at least two pipehandling devices is a multi-gripper tubular load and preparation pipehandling device designed to move joints of drill pipe or other tubulars from the V-door of the rig and deliver them into a pair of preparation openings for building stands while drilling activities continue at well center. In one such embodiment, the system consists of a stand building truss device comprising at least one vertical truss mounted inside the derrick in a position having at least two independent gripping devices capable of accessing a V-door pick up point and preparation openings using a powered slew about a vertical axis.

In another embodiment, the radius of the tubular load and preparation pipehandling device intersects the operating reach of a tubular torquing device, such as a standard iron roughneck for making up connections between tubulars. In such an embodiment it is preferred for the operating reach of the iron roughneck to also intersect the well center and the preparation openings for use in making connections while tripping.

In another embodiment of the invention the radius of the tubular load and preparation pipehandling device is also designed to intersect through a V-door, the edge of the drilling platform such that at least one of the at least two arms of the pipehandling device may hoist tubulars from outside off the drilling platform, such as from an external storage area via a tubular ramp.

In still another embodiment of the invention at least one of the at least two pipehandling devices is a storage pipehandling device comprising a robotic arm mounted generally in a mast or derrick type drilling structure to provide for moving drill pipe and drill collars between the well center or stand building location to the setback position and back again.

In yet another embodiment the invention comprises a method of loading, constructing and drilling comprising a series of steps including moving tubulars with the load and preparation pipehandling device from off the drill floor to on the drill floor, then constructing stands of pipe out of the tubulars at the preparation opening, and then withdrawing the prepared stands from the preparation opening to the storage area by means of the storage pipehandling device.

In one such embodiment, during operation a first of the at least two gripping devices of the load and preparation pipehandling device picks up a tubular body at the V-door pick up point and moves it to a first preparation hole position. In one embodiment, the first gripping device of the load and preparation pipehandling device is then moved back to the V-door pick up position and a second tubular body is hoisted and rotated to the preparation opening and attached to the first tubular body. The tubular is then lifted from the preparation opening by the first gripping device and the second gripping device of the preparation pipehandling device is moved to the V-door pick up position and a third joint is hoisted and lowered into position into the first preparation opening and joined with the first and second tubulars, which are slewed into position over the third tubular in the preparation opening by the second gripping device using an iron roughneck or other conventional torque wrench device into a double. The made-up length is then hoisted and the load and preparation pipehandling device is slewed towards the storage pipehandling device. The storage pipehandling device is used to accept the length from

the load and preparation pipehandling device and the storage pipehandling device retracts and moves the stand into the desired position in the storage area.

In still yet another embodiment of the invention, the first and second gripping devices of the load and preparation pipehandling device operate in an alternate fashion such that the first gripper picks up a first tubular, the second gripper picks up a second tubular, the two tubulars are then delivered in succession to the mousehole and joined using an iron roughneck or other conventional torque wrench device into a double. The made-up length is then hoisted by one of the two gripping devices and the load and preparation pipehandling device is slewed towards the storage pipehandling device. The storage pipehandling device is used to accept the length from the load and preparation pipehandling device and the storage pipehandling device retracts and moves the stand into the desired position in the storage area.

In still yet another embodiment of the invention, the two gripping devices of the load and preparation pipehandling device operate simultaneously to pick up two tubulars from off the drill floor and load them through the V-door to the preparation opening or openings.

In still yet another embodiment of the invention, a just-in-time delivery system for made-up tubulars may be employed. In such an embodiment, the made-up tubular is handed straight from of the invention to the storage pipehandling device for placement into the drill opening without placing the made-up length into a storage area.

In still yet another embodiment of the invention, the joints or tubular body sections used in the method and apparatus according to the invention may comprise drill tube singles, well casing singles, drill collars, stabilizers, centralizers, scratchers, drill bits, and other drill string or drill casing components as well as production tubing sections. By using the method according to the invention, such tubular body sections may be assembled into tubular lengths, such as drill string and well casing stands (usually doubles or triples), bottomhole assemblies or bottomhole assembly parts, logging assemblies, etc.

In still yet another embodiment, the method and apparatus of the current invention may also be used for disassembling tubular lengths, and the resulting tubular body

sections or singles may then be transported to the storage area on the drill floor or to an alternative storage site outside the drill floor.

It should be understood that the drilling rig according to the invention may be a land rig as well as an offshore rig.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the present invention will be better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a side view of the derrick of one exemplary embodiment of a drilling rig according to the invention;

FIG. 2 is a diagrammatic view of an exemplary two arm exemplary load and preparation pipehandling device according to the invention;

FIG. 3 is a diagrammatic view of an exemplary storage pipehandling device according to the invention;

FIG. 4 is a diagrammatic top plan view showing the drill floor of the exemplary embodiment of the drilling rig shown in FIG. 1;

FIG. 5 is a diagrammatic view of an exemplary two-arm load and preparation pipehandling device having off-platform pipehandling capabilities according to the invention;

FIG. 6 is a diagrammatic view of an exemplary two-arm load and preparation pipehandling device having simultaneous off-platform pipehandling capabilities according to the invention;

FIGS. 7-18 are diagrammatic side views illustrating various steps of exemplary embodiments of stand preparation methods according to the invention; and

FIGs. 19 to 26 are diagrammatic side views illustrating various steps of an exemplary embodiment of a drilling method according to the invention

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides an apparatus for moving pipe on a rig floor between a number of different stations including an off-floor rack, a preparation opening,

a borehole, and a storage area, such that tubulars can be loaded onto the drill floor, prepared at the preparation opening loaded onto or off of the storage rack, and connected to a drill string while drilling is simultaneously conducted at the borehole.

An exemplary drilling rig integrating the current invention is shown schematically in FIG. 1 of the drawings and generally comprises a derrick 10 extending upwards from a drill floor or platform area 11. A drilling hoist 12 comprising a traveling block 13 and a swivel and hook assembly 14 is mounted at the upper part of the derrick 10. A top drive unit 15, which is mounted on a carriage 16 so as to be displaceable along a vertically extending track 17, is suspended by the hoist 12 in a manner known per se. The drilling hoist 12 and the top drive unit 15 suspended thereby are substantially aligned with a drilling opening 18 defined in the drill floor, and the top drive unit 15 may be brought into rotary driving engagement with the upper end of a drill string 19 extending through the drilling opening 18.

At least one assembling or preparation opening 21, which is defined in the drill floor 11 is located adjacent to the drilling opening 18. A multi-armed tube handling and transporting mechanism for loading drill pipe and preparing drill stands 22 ("load and preparation pipehandling device") comprising a vertically extending frame 23 and at least two vertically aligned gripping devices 24a and 24b mounted thereon is also provided adjacent to the preparation opening 21 and a vertical or V-door 25 provided in the side of the derrick 10 for access to areas off the drill floor 11, such as an external catwalk 25a and a tubular access ramp 25b.

The drill floor 11 may further comprise storage areas 26 and 27 arranged in setback areas within the confines of the derrick for storing drill string or well casing stands or bottomhole assembly parts in a vertical position, for example by means of conventional fingerboards 28. In such an embodiment, a second tube handling and transporting mechanism 29 ("storage pipehandling device") for loading and unloading stands of tubulars from the storage areas 26 and 27 comprising a rotatable and extendable gripping device 31 mounted generally in the setback area within the derrick structure to provide for moving tubulars between the well center or stand building location to the setback position or back again. In one preferred embodiment, as shown in FIGs. 1 to 3,

the second pipehandling device 29 is mounted in an upper portion of the derrick between the two storage areas 26 and 27.

The drill floor further carries drawworks 32 associated with the drilling hoist 12. A drillers' cabin 33 and a cabin 34 for the operator of the preparation hoist and other devices are also placed on the drill floor. It should be understood that although one configuration of these devices is shown in FIG. 1 that any functional arrangement of these elements may be utilized in the offline standbuilding system of the current invention.

As shown in detail FIG. 2, in one embodiment the frame 23 of the load and preparation tube handling and transporting mechanism (pipehandling device) 22 comprises a vertical shaft 35 having multiple gripping devices 24a and 24b attached thereto. The vertical shaft 35 is mounted in lower 36 and upper 37 rotary platforms, so that the shaft may be pivoted about its longitudinal axis. Each of the gripping devices 24a and 24b may either comprise a gripper attached at the end of a hoisting line arranged at the end of an arm of fixed radius, or may alternatively be attached at the end of an arm which may be extended a predefined distance out from the vertical shaft 35. In addition, the grippers 24a and 24b may either be independently rotatable, or radially offset one from the other such that the grippers can simultaneously handle tubulars using the rotary motion of the vertical shaft 35. In either embodiment, the gripping devices 24a and 24b may also rotate around the axis of the tube handling and transporting mechanism such that the gripping devices 24a and 24b may be moved within a circle 38 of defined outer radius which is indicated by a dot-and-dash line in FIG. 2.

As shown in FIGs. 4, the loading and preparation tube handling and transporting mechanism 22 is aligned such that the stroke and travel of the device 38 allows for the movement of tubulars between the V-door and the preparation opening. It should be understood, however, that other suitable arrangements of the load and preparation pipehandling and transporting mechanism may be used. For example, as the figures also show, the gripping device may also be used to hoist and lift a tubular in a vertical direction. In another embodiment of the invention the load and preparation pipehandling and transporting mechanism may also provide a hoist mechanism designed to lift a tubular from off the drill floor 11, such as from a catwalk 11a via a tubular ramp 11b

(such as that shown in FIG. 5), to within the range of the stroke and travel of the gripping devices 24a and 24b. As shown in FIG. 5, in one preferred embodiment the hoist is designed to extend outward off the drill platform 11 over the ramp 11b such that tubulars may be raised straight from an off-platform catwalk 11a to the outer reach of the transporting mechanism 22. Such a design prevents the normal swing associated with the loading and unloading of pipe from off the drill platform 11.

In this embodiment, the hoisting cable 24a' used to hoist the gripping device 24a of the load and preparation mechanism 22 up and down the vertical shaft 35 runs through an assembly at the end of the fixed radius arm of the gripping device 24a such that when the gripper 24a" gripping device24a is lowered to the bottom of the shaft 35 and reaches a stop position, the hoist cable 24a' and the gripper 24a" at the end of the hoist cable is capable of further movement down the ramp 11b onto the catwalk 11a. Once the gripper 24a" is connected to a joint then, the hoist line 24a' is retracted back to the main body of the load and preparation mechanism 22. In turn when the gripper 24a" hits the underside of the main gripping device 24a the gripper is reconnected with the fixed radius arm and the entire gripping mechanism can be hoisted up the vertical truss 35 as in normal operation. Such an operation can also be built into the other arms of the load and preparation mechanism 22. In such an embodiment each of the arms would be capable of accessing off-floor tubulars. In addition, in such an embodiment the arms could be operated simultaneously to load tubulars onto the drill floor through the V-door as shown in FIG. 6.

It should be understood that although preferred embodiments of the load and preparation pipehandling device are discussed above, that any suitable multi-armed pipehandling device functionally able to manipulate and transport tubulars between a V-door, at least one preparation opening, and the second pipehandling device may be utilized in the current invention.

As shown in detail in FIG. 3, in one embodiment the storage pipehandling device 29 generally comprises an extendable gripping arm 31 having a gripper device 39 on its end mounted to a rotary platform 40 in the setback area within the derrick structure between the storage areas 26 and 27. The storage pipehandling device 29 provides generally for the movement of tubulars between the well center or stand building location

to the setback position and back again. As shown, the gripping device 39 on the arm 31 may be extended a predefined distance out from the vertical shaft rotary platform 40. As the gripping device 39 may extend and swing around the axis of the storage pipehandling mechanism as the rotary platform 40 is rotated, the gripping device 39 may be moved within a circle 41 of defined outer radius which is indicated by a dot-and-dash line in FIG. 3. As shown in FIGs. 4, the storage pipehandling and transporting mechanism 29 is aligned such that the stroke and travel of the device 41 allows for the movement of tubulars between the storage areas 26 and 27, the preparation opening 21, and the drilling opening 18. It should be understood, however, that other suitable designs and arrangements of the storage pipehandling and transporting mechanism may be used such that the functionality to manipulate and transport tubulars between at least one preparation opening, a storage area, and a drilling opening are retained.

In addition, although one exemplary drill floor is depicted and discussed above, other configurations may be constructed to incorporate the combined load and preparation pipehandling device and the storage pipehandling device of the current invention. For example, only one mousehole may be disposed in the surface of the drill floor. Alternatively, additional preparation openings such as a so-called rathole may be defined in the drill floor in addition to the mousehole(s) for receiving a kelly in case it is desired to use a conventional rotary table drive in connection with the drilling rig. A second V-door through which drill string and well casing components may be supplied directly to the preparation opening may also be formed in the derrick in side-by-side relationship with the conventional V-door.

Ultimately it should be understood that the final arrangement and design of the tubular handling system of the current invention will depend on the design and location of the individual components of the drilling rig including: the V-door, the preparation opening(s), the drilling opening and associated drawworks, the storage area(s), and the tubular torquing tool.

The present invention is also directed to a method of operating a drilling rig using offline standbuilding system described above. One exemplary method of operation of the drilling rig described will now be explained in relation to FIGS. 7 to 26. FIGS. 7 to 18 illustrate how a drilling activities can be conducted in the off-line standbuilding system of

the current invention while at the same time any number of pipe stands or assemblies may be assembled in a manner described below.

In general, according to one exemplary embodiment of the method of the invention, a standard triple stand may be assembled in the following manner:

A first single tubular body section, such as a drill tube section 46a, is loaded in from outside the derrick 10 from an off floor catwalk 11a up a tubular ramp 11b through the V-door 25 (FIG. 7), swiveled into position over the preparation opening (FIG. 8), and lowered into the preparation opening 21 (FIG. 9) by the hoist of the first gripper device of the load and preparation pipehandling device 22. In this embodiment the hoist may take many forms. For example, the hoist could be an independent hoist device which could be used only to bring the tubular through the V-door to the multi-gripping device load and preparation pipehandling device. However, preferably the hoisting mechanism of the load and preparation pipehandling device itself is designed such that when lowered one or more of the grippers of the multi-armed load and preparation pipehandling device can be lowered onto the ramp and this gripper hoist can be used to first lift the single tubular body section from outside of the drilling area up a tubular ramp 11b through the V-door to the main body of the pipehandling device 22, as described above and shown in FIGs. 5 to 7. Subsequently, slips are set, the first gripping device of the load and preparation pipehandling device 22 is released and a second single tubular body section 46b is brought in through the V-door 25 in a similar manner either by the first or by a subsequent gripper device. The load and preparation pipehandling device 22 either places this second single tubular 46b into a second adjacent preparation opening 47, or as shown in FIG. 10, suspends this second single tubular 46b above and adjacent to the first tubular 46a in the preparation opening while the two are being assembled by either a conventional tubular torquing device, such as an iron roughneck 48 or by a tubular torquing device mounted on the load and preparation pipehandling device 22 (not shown). It should be understood that although the tubular torquing device discussed in relation to FIG. 10 may be designed to rotate into and out of position other suitable designs may also be used, such as a tubular torquing device with a linear travel aligned along a path such that it may reach both preparation opening 21 and drill opening 18, or a combination device having both rotatable and linear travel.

Regardless of the actual design of the tubular torquing device, in one embodiment, if a single preparation opening is used, the slips are released and the double tubular assembly 49 is raised out of the preparation opening by a first gripper 24a of the load and preparation pipehandling device 22 to a position such that the assembly is above the drill floor 11. Then a third single tubular 46c is brought in by the second arm 24b of the load and preparation pipehandling device 22 which loads this third single tubular 46c into the preparation opening 21, then the double assembly is slewed over the preparation opening by the first gripper and the single tubular is being connected to the double assembly in the preparation opening 21 by means of the tubular torquing device 48, as shown in FIGs. 11 and 12.

Although a method of building tubulars using principally a first gripping device is described above, it should be understood that any combination of gripping devices may be used in the current invention. For example, in one embodiment an alternating method may be utilized to construct tubulars using a single mousehole. In such an embodiment, as shown in FIGs. 13 to 16, the first gripping device 24a of the load and preparation pipehandling device 22 brings a first single tubular body section 46a through the V-door 25, and then the second gripping device 24b brings a second single tubular body section 46b through the V-door 25 in a similar manner. The load and preparation pipehandling device 22 then places the first single tubular 46a into a preparation opening 47 and suspends the second single tubular 46b above and adjacent to the first one 46a in the preparation opening, while the two are being assembled by either a conventional tubular torquing device. The first gripping device 24a then lifts the assembled double out of the preparation opening and a third single 46c is brought through the V-door 25 by the second gripping device 24b and is placed in the vacant preparation opening 47. The double is then slewed into position over and adjacent to the third single and the triple is assembled as described above.

As discussed earlier and shown in FIG. 6, in yet another embodiment of the invention it is possible for two offset gripping devices 24a and 24b of the load and preparation pipehandling device 22 to manipulate tubulars up and off floor catwalk simultaneously to provide even faster assembly of stands of pipe at the preparation opening.

Although the above discussion has focused on single preparation opening rigs, if two preparation openings are used the multiple grippers of the load and preparation pipehandling device may be used in a number of different combinations. For example, in an embodiment the third single tubular 46c is brought in by the second gripper and the load and preparation pipehandling device 22 suspends this third single tubular above and adjacent to the second single tubular 46b in the second preparation opening 47 the two single tubulars are then connected by means of the tubular torquing device 48. Then either the first or second gripper of the load and preparation pipehandling device 22 lifts the double assembly 49 out of the second preparation opening 47 and suspends this double assembly above and adjacent to the first single tubular 46a in the first preparation opening 21. The double assembly 49 and the single tubular 46a are then connected by means of the tubular torquing device 48.

Regardless of the technique used to build the stands, once the full triple assembly 50 is prepared, the slips on the preparation opening 21 are released and the completed triple stand is lifted out of the preparation opening 21 by the load and preparation pipehandling device 22, whereafter the completed stand is transferred to the storage pipehandling device 29 (FIG. 17), which may either move the stand to one of the storage areas 26 or 27 where the stand is stored (FIG. 18), or directly to the drilling opening 18 for "just-in-time" stand building operations where the stand is transferred to the drill hoist 12. It should be understood that stands of well casing sections and other tubular sections such as drill collar sections may be assembled as described above, and that such stands may be disconnected into singles also by a reversed procedure at the preparation opening(s).

Although the preparation openings are described above as incorporating slips, it should be understood that any suitable mechanism for holding pipes within the preparation openings may be utilized. For example, the preparation openings may include a scabbard with either a fixed or adjustable bottom thereby eliminating the need for slips at the drill floor level.

Bottomhole assemblies can also be put together in a similar way as that described above, but the number of parts in a 90' (app. 30 m) assembly may be different. For example, the process of making bottomhole assemblies will typically start with the drill

bit, which is brought in and placed in a so-called bit breaker on top of the preparation opening followed by a tubular, so-called BHA part, which is brought in and suspended from the load an preparation pipehandling device, so that the lower end is contacting the drill bit (not shown). The two parts are connected by the spinning and torquing device 48 and then lifted out of the bit breaker. The bit breaker is removed and the interconnected two parts are lowered into the preparation opening and set in slips. From this point on, the stand is completed in the same way as other stands of drill collar sections, drill tube sections, etc. The stands prepared may be transported to one of the storage areas for later use.

Further, although the terms joints and tubulars are used generically throughout this discussion, it should be understood that the joints or tubular bodies used in the method and apparatus according to the invention may comprise drill tube singles, well casing singles, drill collars, stabilizers, centralizers, scratchers, drill bits, and other drill string or drill casing components as well as production tubing sections. By using the apparatus and method according to the invention, such tubular bodies may be assembled into tubular lengths, such as drill string and well casing stands (usually doubles or triples), bottomhole assemblies or bottomhole assembly parts, logging assemblies, etc.

Although only the loading and preparation of a full stand are described above, it should be understood that simultaneous with this activity other drilling activities may be taking place, as shown in FIGs. 19 to 26. For example, at any point during the standbuilding procedure described above where the storage pipehandling device 29 is not in use, a made-up stand 50 or other downhole assembly may be transported from one of the storage areas 26 or 27 (FIG. 19) to the drilling hoist 12 (FIG. 20) in which the assembly may be suspended and thereafter lowered into the drill opening 18 (FIG. 21). As discussed, while the actual drilling operation is taking place, further drill string stands 50 may be prepared from single tubulars 46 or drill tube sections supplied through the V-door 25 as previously described. These prepared drill string stands 50 may be transported to the storage areas 26 and 27, or to the drilling opening 18.

FIGs. 22 to 26 illustrate the overall operation of the system. In FIG. 22, the drilling operation has just been continued after addition of a drill string stand 50 to the upper end of the drill string, which means that the top drive unit 15 is in its upper

position. At the same time, a further drill string stand 50 is being prepared at the preparation opening 21 in which a tube section 46a has been set by slips while a further tube section 46b has just been brought in through the V-door 25, such as up a tubular ramp 11b by the second arm of the load and preparation pipehandling device 22.

In FIG. 23 the drilling operation has proceeded and the top drive unit 15 has been moved a certain distance downwards. The preparation of a further drill string stand 50 has just been completed at the preparation opening 21, and the stand prepared has been gripped by the storage pipehandling device 29 which transports the drill string stand 50 to one of the storage areas 26 or 27.

After a certain period of time the drill string 19 has penetrated such a distance into the underground that the top drive unit 15 reaches its lower position as shown in FIG. 24, and the drilling operation has to be stopped for the addition of a further drill string stand 50. Therefore, the top drive unit 15 is disconnected form the upper end of the drill string 19, and the carriage 16 supporting the top drive until 15 is moved to a retracted position shown in FIG.25, whereby the top drive unit is moved to the left out of alignment with the drilling opening 18. (Note that while this description discuss a top drive block retraction system, this system is not required for the practice of the invention and any suitable top drive arrangement may be used.) While the top drive unit 15 is being moved upwards, a drill string stand 50 is gripped by the storage pipehandling device 29 at one of the storage areas 26 and 27 and moved to a position in which the stand 50 is positioned immediately above and is aligned with the drill string 19, FIG. 26. Thereafter, the stand 50 may be connected to the drill string 19 by means of the tubular torquing device 48. When the top drive unit 15 has reached its upper position the carriage 16 is returned to its normal, extended position, and the top drive unit may again be brought into driving engagement with the upper end of the newly mounted stand 50, whereafter the drilling operation may continue.

Although the above description has been discussed with relation to a single arm load and preparation pipe handling device, it should be understood that the enhanced capabilities of the multi-armed device may be utilized for the offline standbuilding activities described above.

After a certain drilling period the bottomhole assembly has to be replaced, which means that the drill string 19 must be tripped out. The drill string is then disconnected into drill string stands 50 in a reverse process to that described above, and the drill stands are stored in the storage areas 26 and 27. As described above, the new bottomhole assembly may have been prepared beforehand at the preparation opening 21 in the manner previously described and may be ready in one of the storage areas 26 and 27.

It should be understood that well casing stands and other components, such as logging assemblies, may also be prepared at the preparation opening by procedures similar to those described above for bottomhole assembly parts and drill string stands. Thus, the method according to the invention renders it possible to reduce the idle time in operating a drill rig, whereby essential savings may be obtained.

Accordingly, although specific embodiments are disclosed herein, it is expected that persons skilled in the art can and will design alternative offline standbuilding systems and methods that are within the scope of the following claims either literally or under the Doctrine of Equivalents.